BBA Sixth Semester
Total Quality Management

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Syllabus

- Introduction to Quality and Quality management
- Conceptual Frameworks for Total Quality Management (TQM)
- TQM Tools
- Six Sigma
- Quality System Standards
Total Quality Management

- Chapter-2
- Conceptual Framework for TQM
Conceptual Frameworks for Total Quality Management

- Early TQM Frameworks and Concepts: Deming’s fourteen points, Juran’s ten steps, Corsby’s four absolute and fourteen steps to manage improvement, Feigenbaum’s approach to total quality control, Concept on Kaizen’s tools—PDCA, 5s, 7 wastes, 7 old and new quality tools, 5 whys, value stream mapping,
Conceptual Frameworks for Total Quality Management

- Workstation improvement and success stories, Shigeo Shingo’s approach—Zero quality control, Just-In-Time (JIT), and Single Minute Exchange of Dies (SMED), Garvin’s eight quality dimensions, Ishikawa (Fishbone) diagram, Taguchi’s philosophy to quality, The common causes of TQM failures
Development of Quality

Total Quality Management

Quality Assurance

Quality Control

Inspection
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Inspection 1800s</th>
<th>SQC 1930s</th>
<th>Quality Assurance 1950s</th>
<th>TQM 1980+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary concern</td>
<td>Detection</td>
<td>Control</td>
<td>Coordination</td>
<td>Management</td>
</tr>
<tr>
<td>View of Quality</td>
<td>A Problem</td>
<td>To be solved</td>
<td>Proactive attack</td>
<td>A competitive opportunity</td>
</tr>
<tr>
<td>Emphasis</td>
<td>Product uniformity</td>
<td>Uniform product with less inspection</td>
<td>Designers role</td>
<td>The market and consumer needs</td>
</tr>
<tr>
<td>Methods</td>
<td>Gaugging, measurement</td>
<td>Statistical quality tools</td>
<td>Programs and systems</td>
<td>Strategic planning, goal setting</td>
</tr>
<tr>
<td>Who is responsible</td>
<td>Inspection dept.</td>
<td>Manufacturing and engineering departments</td>
<td>All Departments</td>
<td>Every (Team) one in the organization</td>
</tr>
<tr>
<td>Orientation and approach</td>
<td>Inspects quality</td>
<td>Controls quality</td>
<td>Builds in quality</td>
<td>Manages in quality</td>
</tr>
</tbody>
</table>
Introduction

- **Total** – Made up of the whole (or) Complete.
- **Quality** – Degree of Excellence a product or service provides to the customer in present and future.
- **Management** – Act, art, or manner of handling, controlling, directing, etc.

**TQM** is the art of managing the whole to achieve excellence.
"TQM is a management approach for an organization, centered on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to all members of the organization and to society."

**Definition**

TQM is composed of three paradigms:

**Total**: Organization wide

**Quality**: With its usual Definitions, with all its complexities [External Definition]

**Management**: The system of managing with steps like Plan, Organise, Control, Lead, Staff, etc.
Definition
Total Quality Management (TQM) is a management strategy aimed at embedding awareness of quality in all organizational processes.
Explanation
TQM requires that the company maintain this quality standard in all aspects of its business. This requires ensuring that things are done right the first time and that defects and waste are eliminated from operations.
Guru’s of TQM

- Walter.A.Shewhart - TQC
- W.Edwards Deming - 14 Points & PDCA
- Joseph.M.Juran - Juran’s Trilogy and Ten steps
- A.Feiganbaum - Customer requirement, Employee Involvement, TQC.
TQM concept from Quality Gurus

Edward Deming
- Father of Quality Management
- PhD in physics
- keen statistician
- US government in the department of Agriculture and the Bureau of Census
- 1950, Japan, Course on Quality Control
- Japanese embraced the notion of quality under Deming’s inspiration.
Deming

- Deming believes in continuous improvement. He also believes that the consumer is the most important part of a production line. Meeting and exceeding the customers’ requirements is the task that everyone within the organization needs to accomplish with total commitment. Furthermore, Deming believes in the use of statistical process control (SPC) charts as major method for solving problems.
Deming’s Fourteen Points

1. Create constancy of purpose to improve products and services
2. Adopt a new philosophy for the new economic age, with management learning what their responsibilities are and assuming leadership for change
3. Cease dependence on mass inspection to achieve quality, by building quality into the product
Deming’s Fourteen Points

4. End the awarding of business on price; award business on total cost and move towards single suppliers

5. Improve constantly and forever the system of production and service

6. Institute training on the job

7. Institute leadership with the aim of supervising people to help them to do better job.
Deming’s Fourteen Points

8. Drive out fear so that everyone can work effectively together for the organization.

9. Break down barriers between departments. Encourage research, design, sales and production to work together to foresee difficulties belong to the whole system.

10. Eliminate slogans, exhortations and numerical targets for the workforce since they are divisive, given that difficulties belong to the whole system.
Deming’s Fourteen Points

11. Eliminate quotas or work standards and management by objectives or numerical goals; leadership should be substituted instead.

12. Remove barriers that rob people of their right to pride in their work.


14. Take action to accomplish the transformation.
The first three principles clearly focus on the cultural aspects of the organization. The fourth principle focuses on the customer relationship. The fifth principle is aimed for continuous improvement. The sixth, seventh and eighth principles are related to human relationships and management style. The ninth principle can be seen as linked to principle, a way for breaking down barriers.
The tenth principle, eliminate slogans, exhortation and numerical quotas.

Setting of targets and quotas is potentially meaningless and divisive unless accompanied by a specific action plan to improve the process.

Giving the work force a chance to work with pride.

The idea of principle thirteen is continuously improve

The final principle is to put everyone to work to achieve the transformation.
Deming Action Plan

1. Management must agree on the meaning of the quality programme, its implications and the direction to take

2. Top management must accept and adopt the new philosophy

3. Top management must communicate the plan and the necessity of it to the people in the organization

4. Every activity must be recognized as a step in a process and the customers of that process identified; the customers are responsible for the next stage of the process.
Deming Action Plan

5. Each stage must adopt the ‘Deming’ or ‘Shewart’ cycle - Plan, Do, Check, Action - as the basis of quality improvement.

6. Team working must be engendered and encouraged to improve inputs and outputs, everyone must be enabled to contribute to this process.

7. An organization for quality must be constructed with the support of knowledgeable statisticians.
Joseph M. Juran

- 1924, Engineer
- Worked as civil servant, executive, academic, arbitrator, director and management consultant.
- Quality Control Handbook
- 1950 Movement of Quality in Japan
## Quality Trigology

<table>
<thead>
<tr>
<th>Quality Trilogy</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quality planning</strong></td>
<td>The activity of developing the products and processes required to meet customers’ needs.</td>
</tr>
<tr>
<td><strong>Quality control</strong></td>
<td>This process deals with execution of plans, conducting operations to meet the goals</td>
</tr>
<tr>
<td><strong>Quality improvement</strong></td>
<td>This process is the means of raising quality performance to unprecedented level.</td>
</tr>
</tbody>
</table>
Juran’s Ten Steps

1. Build awareness of the need and opportunity for improvement.
2. Set goals for improvement.
3. Organize to reach the goals (establish a quality council, identify problems, select projects, appoint teams, designate facilitators).
4. Provide training.
5. Carry out projects to solve problems.
Juran’s Ten Steps

8. Communicate results.
9. Keep score
10. Maintain momentum by making annual improvement part of the regular systems and processes of the company.
Philip B. Crosby

- Graduate of the Western Reserve University
- After military service
- Quality control in manufacturing,
- Line inspector to quality director
- Philip Crosby Associates Incorporated and the Quality College based in Florida.
### Four Absolute

<table>
<thead>
<tr>
<th>First Absolute</th>
<th>The definition of quality is conformance to requirements, not goodness.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second Absolute</td>
<td>The system for causing quality is preventive, not appraisal.</td>
</tr>
<tr>
<td>Third Absolute</td>
<td>The performance standard must be zero defect, not “that’s close enough”.</td>
</tr>
<tr>
<td>Fourth Absolute</td>
<td>The measurement of quality is the price of non – conformance, not indexes</td>
</tr>
</tbody>
</table>
Crosby’s Fourteen Steps

Step 1 : Establish and ensure management commitment. It is vital that the whole management team participate in the programme.

Step 2 : Form quality improvement teams (QITs) for quality improvement process planning and administration. The emphasis here is on multidisciplinary team effort. An initiative from the quality department will not be successful. It is essential to build team working across arbitrary; and often artificial, organizational boundaries.
Crosby’s Fourteen Steps

Step 3: Establish quality measurements. These must apply to every activity throughout the company. A way must be found to capture every aspect, design, manufacturing, delivery, and so on. These measurements provide a platform for the next step.

Step 4: Evaluate the cost of quality and explain its use as a management tool to measure waste. This evaluation must highlight, using the measures established in the previous step, where quality improvement will be profitable.
Crosby’s Fourteen Steps

Step 5 : Raise quality awareness among all employees. This is normally undertaken through the training of managers and supervisors, through communications such as videos and books, and by displays and posters.

Step 6 : Take actions to correct problems identified through previous steps. This involves encouraging staff to identify and rectify defects, or pass them on to higher supervisory levels where they can be addressed.
Crosby’s Fourteen Steps

Step 7 : Establish a zero defects committee and programme. This is done by establishing a committee or working group to develop ways to initiate and implement a zero defects programme.

Step 8 : Train supervisors and managers on their role and responsibilities in the quality improvement process. This step is focused on achieving understanding by all managers and supervisors of the steps in the quality improvement programme in order that they can explain these in turn.
Crosby’s Fourteen Steps

Step 9: Hold a zero defects day to reaffirm management commitment. This can be achieved in a celebratory atmosphere.

Step 10: Encourage individuals and groups to set improvement goals. Goals are of course of no value unless they are related to an appropriate timescale for their achievement.

Step 11: Obstacle reporting (i.e., encourage employees to communicate to management any obstacles they take in attaining their improvement goals).
Crosby’s Fourteen Steps

Step 12: Recognize and appreciate all participants.

Step 13: Establish quality councils to discuss quality matters on a regular basis. These are essentially forums composed of quality professionals and team leaders allowing them to communicate and determine action plans for further quality improvement.

Step 14: Do it all over again to demonstrate that the improvement process never ends. Achievement of quality is an ongoing process. There is always further to go.
Armand V. Feigenbaum

- concept of Total Quality Control (TQC).
- His book “Total Quality Control” was first published in 1951
- quality as a strategic business tool that requires involvement from everyone
- quality control as a measurement and evaluated tool.
- Quality begins with identification of customers requirements and ends with a product or service in the hands of a satisfied customer.
Ten attributes of Feigenbaum

1. Total Quality control must be a company-wide process. It is a system for integrating quality development, maintenance and improvements efforts in an organization that will enable engineering, marketing, production and service to function at optimal economic levels while achieving customer satisfaction.

2. Quality is defined by the customer.
Ten attributes of Feigenbaum

3. **Quality and cost is a sum**, not a difference. Operating quality costs can be divided into four categories: prevention costs, appraisal costs, internal failure cost and external failure costs.

4. Quality requires both individual and team enthusiasm.

5. Quality is a way of managing.

6. Quality and innovation are interdependent.
Ten attributes of Feigenbaum

7. Quality is an ethic.
8. Enhanced quality demands continuous improvement.
9. Quality is the most cost-effective and least capital-intensive route to productivity.
10. Quality is implemented with a total system connected with customers and suppliers.
Concept of Kaizan tools

- Kaizen is ongoing improvement which involves everyone in the organization.
- Kaizen is a people-oriented approach to competitiveness
- Continuous improvement will benefit the organisation and in turn will benefit the individual
- Continuous improvement focuses on the whole process (means and the ends) rather than the results only
**PDCA Cycle**

**Plan**: Establish the objectives and processes necessary to deliver result in accordance to customer’s requirements and organizations policies.

**Do**: Implement the process.

**Check**: Monitor and measure process and product against policies, objectives and requirement for the product and report result.

**Act**: Take required actions to continually improve process performance.
<table>
<thead>
<tr>
<th>S.N</th>
<th>Japanese (5S)</th>
<th>English (5C)</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Seiri</td>
<td>Clear cut (organize)</td>
<td>Determine what is necessary and unnecessary and dispose of the later</td>
</tr>
<tr>
<td>2</td>
<td>Seition</td>
<td>Configuration (systematise)</td>
<td>Provide a convenient, safe and orderly place for everything and keeping it there.</td>
</tr>
<tr>
<td>3</td>
<td>Seiso</td>
<td>Clean and check</td>
<td>Monitor and restructure the condition of working areas during cleaning</td>
</tr>
<tr>
<td>4</td>
<td>Seiketsu</td>
<td>Conform (standardisation)</td>
<td>Set standard, train and maintain.</td>
</tr>
<tr>
<td>5</td>
<td>Shitsuke</td>
<td>Custom and Practice (Discipline)</td>
<td>Develop the habit of routine maintenance and strive for further improvement.</td>
</tr>
</tbody>
</table>
Points for successful 5 S

- Participation by all people
- The program requires top management commitment
- The CEO should take leadership of the program
- The program should be supported by all
- 5S program should be self sustaining
- The CEO should take a periodic factory tour in person
- The program should generate sufficient impact at the initial stage
- Implementation of 5S should so hand in hand with other kaizen program.
<table>
<thead>
<tr>
<th>Waste of</th>
<th>Meaning</th>
<th>How to control?</th>
</tr>
</thead>
</table>
| 1. Stock      | Stocking more than required                      | • Reduce Lead Time  
• Improve skill of worker  
• JIT productions |
| 2. Waiting    | Wait of job to be performed                      | • Balance and even loads to the equipments  
• Flexible workers |
| 3. Over production | Producing more than required                    | • Fair prediction of demand  
• Reducing set up times.  
• Use of small specialized production rather than large. |
| 4. Transportation | Un-necessary material Dispatch & transport to location | • Efficient material handling system.  
• Better location layout decision. |
| 5. Processing | All parts are processed at a time for production | • Put into process what is required only.  
• Suitable technology |
| 6. Motion     | Motion for productivity & quality consistency (Automating waste) | • Improve the motion and then apply automation  
• Group Technology |
| 7. Defective products | More defective outputs making                   | • Quality at source  
• Technology improvement  
• Skilled manpower |
Tools for Quality Control

- Pareto Analysis
- Scatter Diagram
- Control Charts
- Flow Charts
- Cause and Effect, Fishbone, Ishikawa Diagram
- Histogram
- Check Sheets
Parato Analysis

- 80:20 Rule
- Detection of Vital few
## Restaurant Complains

<table>
<thead>
<tr>
<th>Complaint</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discourteous server</td>
<td>12</td>
</tr>
<tr>
<td>Slow service</td>
<td>42</td>
</tr>
<tr>
<td>Cold dinner</td>
<td>5</td>
</tr>
<tr>
<td>Cramped tables</td>
<td>20</td>
</tr>
<tr>
<td>Smoky air</td>
<td>10</td>
</tr>
</tbody>
</table>
Parato Chart

Count

Percent

0% 25% 50% 75% 100%

Slow Service 42
Crammed Tables 20
Discourteous server 12
Smoky Air 10
Cold Dinner 5

Complain
Scatter Diagram

(a) Positive and Linear

(b) Negative and Linear

(c) Negative Non-Linear

(d) No Relationship
Scatter Diagrams

- Scatter diagrams are used to represent and compare two sets of data.
- Plot points of pairs of observations has the values \((X_1, Y_1), (X_2, Y_2), (X_3, Y_3), \ldots, (X_n, Y_n)\).
Control Chart
Flow Chart

1. Lamp doesn’t work
2. Lamp plugged in?
   - Yes: Bulb burned out?
     - Yes: Replace bulb
     - No: Buy new lamp
   - No: Plug in lamp

Thus, resolving the lamp issue step by step.
Histogram or Bar Graph

![Histogram or Bar Graph](image)

**Score on final exam (maximum marks = 25)**

**No. of students**

- Blue: 0
- Red: 10
- Green: 15
- Purple: 10
- Teal: 5

- Scale: 0, 5, 10, 15, 20
<table>
<thead>
<tr>
<th>COMPLAINT TYPE</th>
<th>TALLY</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUALITY</td>
<td></td>
<td>39</td>
</tr>
<tr>
<td>Packaging</td>
<td></td>
<td>47</td>
</tr>
<tr>
<td>Infestation</td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>Foreign Material</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>
Seven New QC tools

- numerical data cannot always adequately express the facts
- The Seven New Q.C Tools are Affinity diagrams, Relation diagrams, Tree diagrams, Matrix diagrams, Priorities matrix, Arrow diagrams and Process decision program charts.
Affinity Diagram

- It is a technique to generate ideas and link up with other ideas to form a common idea which facilitates breakthrough thinking and stimulate fresh ideas.
- The large number of ideas generated can be grouped according to their “affinity” or relationship to each other.
Affinity Diagram

**Personnel are not Quality Conscious**
- Operators are making mistakes
- Inspectors do not check the quality during production
- Workers do not care about the product quality
- No quality training

**Poor Subcontractor Material**
- Raw material is sub-standard
- No incoming inspection
- Sub-contractors are not chosen properly
- Poor quality of raw materials
- Cheaper raw materials are being used

**Defective products are reaching the customers**
- Actual standards are not available
- Final inspection is very poor
- No calibration of the equipment
- Inspection methods are very poor
- Defective products not segregated
- Inspection & testing equipment are old & inaccurate

**Employees Absenteeism**
- Any other operator is asked to do the job when the actual operator is absent
- Leave rules are very relaxed
- There are not enough skilled operators
- There are no alternative operators
- No incentives for good attendance

**High incidents of customer's complaints due to poor product quality**
Relation Diagram

- Relation diagram identifies and explores casual relationships among related concepts or ideas.
- It shows that every idea can be logically linked with more than one other idea.
- Relation diagram is useful tools for finding appropriate strategies by relating different causes of a problem by identifying the root causes of the problem.
Relation Diagram

- Subcontractors are not chosen properly
- Poor subcontractor material
- Good subcontractors are costly
- Personnel are not quality conscious
- No training on quality awareness
- Not enough resources
- High incidence of customer complaints due to poor product quality
- Defective products are reaching the customers
- Final inspection is poor
- Employee absenteeism
- Insufficient training of inspectors
- Inaccurate inspection equipment
- Poor management support
- No facts or data presented to management
- Poor incentive system
Tree Diagrams are drawn to develop a succession of strategies/means for achieving an objective (target, goal or result) systematically and logically.

Constructing this diagram yields specific guidelines for solving a problem.

Tree Diagrams are also classified as strategy-development or component development diagrams.
To eliminate/decrease the incidence of customer complaints due to poor product quality

Select better suppliers:
- Check reputed ones
- Conduct supplier audits
- Choose one with a better quality system

Establish quality awareness programs:
- Provide training
- Select good trainers
- Allocate training budget

Implement incentives for perfect attendance:
- Full attendance award
  - Motivate/create interest in work
  - Display attendance performance
- Improve inspection & testing equipment
- Provide training for inspectors
- Strengthen the inspection method

Improve final inspection
Matrix Diagram

- Matrix diagram provides a picture of how well two sets of objects or issues are related and can identify missing pieces in the thought process. The visual depictions can help managers set priorities on plan and actions.
## Matrix Diagram

<table>
<thead>
<tr>
<th>Actions/Goods</th>
<th>Improve work Environment</th>
<th>Improve Manufacturing Technology</th>
<th>Develop New Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Effectiveness</td>
<td>●</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>High Quality</td>
<td>●</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Shareholder value</td>
<td></td>
<td>▲</td>
<td>●</td>
</tr>
</tbody>
</table>
Priority Matrix

- This type of matrix is drawn when there are many tasks but there are not enough resources. So instead of just thinking which tasks are more important, the Priority Matrix is drawn.

- Matrix data analysis takes data and arranges them to display qualitative relationship among variables to make them more easily understood and analysed.

- It is based on the “factor analysis” of Statistical techniques.
# Priority Matrix

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Important Weight</th>
<th>Best Competition Evaluation</th>
<th>Our Company Evaluation</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>0.2</td>
<td>6</td>
<td>8</td>
<td>+2</td>
</tr>
<tr>
<td>Reliability</td>
<td>0.4</td>
<td>7</td>
<td>8</td>
<td>+1</td>
</tr>
<tr>
<td>Delivery</td>
<td>0.1</td>
<td>8</td>
<td>5</td>
<td>-3</td>
</tr>
<tr>
<td>Technical support</td>
<td>0.3</td>
<td>7</td>
<td>5</td>
<td>-2</td>
</tr>
</tbody>
</table>
Arrow diagram

- This is also known as activity network diagram and is similar to Critical Path Method (CPM).

- It describes that who is going to do what and when?, what can be done in parallel and what can be done only in series, one after another.

- This diagram is mostly used by planning aid for construction projects and large manufacturing units.
Arrow Diagram

1. Lay Foundations
2. Construct Walls
3. Roofing
4. Install Fixtures & Fittings
5. Decorate Exterior
6. Finish off Interior
7. Woodwork
8. Plumbing
9. Electric
10. Decorate Interior Walls
11. Inspect & Hand over
12. Finish off Exterior
Process decision program charts (PDPC)

- Process decision program charts (PDPC) is a method for mapping out every conceivable event and contingency that can occur when moving from problem statement to possible solutions. PDPCs are used for planning the activities needed to solve problem when information is incomplete or the situation is fluid and hard to forecast.
EXAMPLE PDPC FOR HOLDING IN-HOUSE SEMINAR ON SEVEN NEW QC TOOLS

**Plan Seminar**

1. Reserve venue → Seek more spacious venue → Found → Check facilities
   - Available
   - Not available → Arrange

2. Distribute application → Too many applicants → Too few applicants → Selection criteria
   - Designate from each area
   - Ask managers to reduce
   - Put applicants for next course
   - Ask managers to nominate
   - Designate from each area
   - Inform people about usefulness

3. Arrange outside instructor → Suddenly become unavailable → Arrange substitute instructor
   - Internal trainer acts as instructor

4. Arrange course material → Get from training institute
   - Use some books in tools
   - Prepare training material
   - Too much to cover
     - Reduce course material
   - Too short to cover
     - Decrease time
     - Add examples/exercises

5. Arrange spare generator → Working
   - Arrange fuel and operator

   - Not working
Example: The problem is that client, Suraj Imp., is unhappy. Using the 5 Whys, you go through the following steps to get to the cause of the problem:

1. Why is our client, Suraj Imp., unhappy? Because we didn't deliver our services when we said we would.

2. Why were we unable to meet the agreed-upon timeline or schedule for delivery? The job took much longer than we thought it would.

3. Why did it take so much longer? Because we underestimated the complexity of the job.

4. Why did we underestimate the complexity of the job? Because we made a quick estimate of the time needed to complete it, and didn't list the individual stages needed to complete the project.

5. Why didn't we do this? Because we were running behind on other projects. We clearly need to review our time estimation and specification procedures.
Value Stream Mapping

- Value Stream Mapping (VSM) is the process of mapping the material and information flows required to coordinate the activities performed by manufacturers, suppliers and distributors to deliver products to customers.
- Not only the material flows but also information flows that signal and control the material flows.
VSM

- A typical VSM project involves the development of maps:
  (1) a Current State Map and
  (2) one or more Future State Maps that represent progressive improvements in the Current State Map.
Workstation Improvement

- A reasonable industrial workstation design affects not only the productivity but also the health of workers. In industrial workstation, the primary concern has usually been the improvement of the performance of the equipment and then the matching the abilities of the operator with the task requirement. Many industrial workstations are poorly designed, resulting in lower worker productivity and unnecessary injury at the workplace.
Workstation improvement

- The methods used in workstation improvement simplify the work or working methods and must go towards higher productivity. It is always desirable to perform the requisite function with desired goal with minimum consumption of resources. Workstation is essentially concerned with finding better ways of doing things. It adds value and increases the efficiency by eliminating unnecessary operations, avoidable delays and other forms of waste.
Objective of WSI

1. To improve work methods and procedures.
2. To determine the best sequence of doing work.
3. To smoothen material flow with minimum of backtracking and to improve layout.
4. To improve the working conditions and hence to improve labour efficiency.
5. To reduce monotony in the work.
6. To improve plant and material utilisation.
7. Elimination of waste and unproductive operations.
8. To reduce the manufacturing costs through reducing cycle time of operations.
Work Study

- Method Study
  - Motion Study
- Work Measurement
  - Time Study

Higher Productivity
Shigeo Shingo’s approach - Zero QC

- Defects in production may be due to omitting processing (or operations), processing errors, equipment set-up errors, missing parts/component wrong parts/component and adjustment error
- A good process design prevents defects at all from occurring
ZQC consists of the following

- **Source inspection:** Checking for the factors that cause errors, not the resulting defect.
- **100 percent inspection:** The operator inspects his or her own work 100 percent, or inexpensive Poka-yoke (Poka means error and yokeru means prevent) devices inspect automatically for errors or defective operating condition.
- **Immediate action:** Stopping operations instantly when a mistake is made and not resuming operations until the error is rectified. Feedback is provided through successive checks, in which the next person in the process immediately feedback information to the supplying operator to stop production and fix the error.
Just In Time

- JIT is known as the Japanese philosophy for managing inventory.
- high volume of production by using minimum inventory of raw materials and work in progress
- JIT requires high level of quality at each stage of production process, strong vendor relations and fairly predictable demand for smooth flow of work.
JIT

♦ JIT provides for the cost efficient production in an organization and delivery of only the necessary parts in the right quantity at the right time and place with using the minimum of facilities.

♦ It integrated whole based on the principles of continuous improvements and elimination of all kinds of waste
(i) What is JIT?
A management philosophy; A set of methods

(ii) What it does?
Reduce wastage
Exposes bottle necks & problems
Achieves streamline production.

(iii) How does it do?
Employees participation
Industrial engineering
Continuing improvement.
Total quality control; Small lot size
JIT

(iv) What it assumes?
Stable environment
Fairly predictable demand
Strong vendor relation
Efficient employees
Single Machine Exchange of Die

- If the set-up time is long (high cost), then more products should be produced in one batch in order to reduce set-up cost per unit. Operating like this has the effect of creating more inventories.

- 1980’s Shigeo Shingo, of Toyota Motor Co. studied which ultimate objective was to change a machine tool in less than 10 minutes.
To effect SMED procedures, the logic is to establish the distinction between
- External set-up: Machine is running and
- Internal set-up: Machine is stopped

In general, set-up times can be reduced by:
- Locating required inventory and machine tools closer to the operating area and
- Standardising the set-up functions of machines.
Gravin’s Eight Quality Dimension

- **Performance**: measurable primary characteristics of a product or service
- **Features**: added characteristics that enhance the appeal of a product or service
- **Conformance**: meeting specifications or industry standards
- **Reliability**: consistency of performance over time
- **Durability**: useful life of a product or service
- **Serviceability**: resolution of problems and complaints
- **Aesthetics**: the sensory characteristics of a product or service
- **Perceived quality**: subjective assessment of quality based on cues related to the product
Taguchi Philosophy

- Taguchi's main objective is to identify the factors which are responsible for the product and the process variation and control their settings to optimal level.
- Japanese quality expert known for his work in the area of product design.
- The method is applied in a systematic and scientific way at a pre-production stage offline prior to the setting of the manufacturing process.
Taguchi Philosophy

- Three steps in the engineering design cycle.
  - System design: It is the basic prototype design that meets performance and tolerance specifications of the product. It includes section of materials, parts, components and system assembly.
  - Parameter design: Given a system design, there are generally several parameters whose values need to be determined. One needs to find a functional relationship between the parameter and the measure of performance of the system to determine an optimal value of the parameter.
  - Tolerance design: The purpose of this is to determine allowable ranges of the parameters whose values are optimized in parameter design stage. Achieving the optimal value of a parameter may be very expensive, whereas a sub-optimal value could give the desired quality at lower cost.
Common causes of TQM failure

1. Absence or lack of top management’s commitment.
2. Inadequate knowledge or understanding of TQM principles and methodology.
3. Failure to accept TQM as a cultural revolution, i.e. a change in the organizational culture or the mind set of the employees:
4. Improper planning: Absence of long term vision, mission, and goals by the top management.

Three components of successful TQM planning are
(a) Obtaining company-wide commitment,
(b) Communicating company vision, mission, and goals, and
(c) Providing open communication about the company’s new focus.
Common causes of TQM failure

5. Absence of continuous training and education
6. Inadequate use of empowerment and team work:
7. The Management related barriers are:
   (a) Fear of senior management losing control
   (b) Apprehension and doubts of the senior management, about the efficacy of the TQM methodology
   (c) Lack of leadership qualities
   (d) Failure in or faulty delegation of authority
   (e) Lack of motivation, at the senior level and
   (f) Managers do not support each other.
8. Incorrect or insufficient or incompatible organisational structure and isolated individuals and departments, autocratic organisational structure.
Common causes of TQM failure

9. Inefficient or ineffective measurement techniques and lack of access to data and results

10. The Customer related barriers may be listed as:
(a) Inadequate attention to internal and external customers and the public.
when a new product is launched
(b) Lack of social responsiveness
(c) Risks and benefits to the public are ignored or not evaluated.

11. Inability to build a learning organization that provides for continuous improvement.